FIELD	LEVEL	DETERMNISTIC METRIC	TEMPORAL ATTRIBUTE	NOTABLE THRESHOLDS	REGION	VERIFICATION APPROACH	VALIDATION SOURCE	CLIMATOLOGY SOURCE	SPATIAL MATCHING
TIER 1									
Temperature Anomaly	2-meter	Heidke Skill Score	Daily, Weekly (through Day 35), Monthly (to F720)	85th Percentile and/or all terciles	CONUS, AK, HI, North America, Global	Grid-to-Grid, Grid-to-Obs	ECMWF Reanalysis (ERA5), METARS	Model's Own Climatology	
Oceanic Nino Indices (ENSO)		Anomaly Correlation (climatology); Verification: OSTIA, OISST, OISSTv2.1, ERSST, *not* OISST, ERSSTv5	Weekly (through Day 35)		Tropics	Grid-to-Grid	ECMWF Reanalysis (ERA5)	compute obs and model climatologies separately?	
Precipitation Anomaly	Surface	Heidke Skill Score	Daily, Weekly (through Day 35), Monthly (to F720)		CONUS East + West + Central + South + (Alaska + Hawaii)	grid-to-grid	CCPA, (MRMS Multisensor QPE for AK and HI)	Model's Own Climatology	
NAO/PNA Index		Anomaly Correlation (climatology)	Daily (through Day 35)		Global	Grid-to-Grid	ECMWF Reanalysis (ERA5)	Need to determine if SS computed using climatology or reference forecast	
AO/AAO Index		Anomaly Correlation (climatology)	Daily (through Day 35)		Global	Grid-to-Grid	ECMWF Reanalysis (ERA5)	Need to determine if SS computed using climatology or reference forecast	
Outgoing Longwave Radiation (MJO)	Top of Atmos	RMS + Mean Error Bias	Daily, Weekly (through Day 35), Monthly (to F720)		Global or NH + SH (separately)	Grid-to-Grid	Satellite Data (MODIS ET, ALEXI)	CPC OLR Climatology	
TIER 2									
Tibaldi-Molteni Index (Blocking)		Anomaly Correlation	Weekly (through Day 35)		NH + SH	Grid-to-Grid	ECMWF Reanalysis (ERA5)	Need to determine if SS computed using climatology or reference forecast	
Standardized Precip Index		Heidke Skill Score	Weekly (through Day 35)		Tropics + Mid-Latitudes	Grid-to-Grid	ECMWF Reanalysis (ERA5)	Clarification necessary on climatology source (since reanalysis used as validation)	
Geopotential Height Anomalies	500-hPa	Anomaly Correlation, Heidke Skill Score	Daily, Weekly (through Day 35), Monthly (to F720)		NH + SH + Tropics	Grid-to-Grid	ECMWF Reanalysis (ERA5)	Model's Own Climatology	

FIELD	LEVEL	DETERMNISTIC METRIC	TEMPORAL ATTRIBUTE	NOTABLE THRESHOLDS	REGION	VERIFICATION APPROACH	VALIDATION SOURCE	CLIMATOLOGY SOURCE	SPATIAL MATCHING
Sudden Stratospheric Warming	10 hPa at 60 N	Zonal Mean Zonal Wind at 60N, 10hPa turning easterly, probaility detection or false alarm Zonal wind turns	Daily, Weekly (through Day 35)		NH + SH	Categorical	Satellite Data (MODIS ET, ALEXI)	Need to determine if SS computed using climatology or reference forecast	
Basin-Wide TC Counts		ACC	Daily, Weekly (through Day 35), Monthly (to F720)		All Tropical Basins	Grid-to-Grid	Tallies from Appropriate Warning Centers		
Palmer Drought Severity Index		Heidke Skill Score	Daily, Weekly		Tropics + Mid-Latitudes	Grid-to-Grid	ECMWF Reanalysis (ERA5)	Clarification necessary on climatology source (since reanalysis used as validation)	
Sea Ice Concentration	Surface	Heidke Skill Score, Performance Diagram	Daily, Weekly (through Day 35)	15, 40, 80%	North Polar + South Polar Regions; 50ºN and S is the equatorward boundary for defining the area of interest	Grid-to-Grid	OSI-SAF 10 km Analysis		
TIER 3									
Sea Ice Edge	Surface	Integrated Ice Edge Error, Heidke Skill Score	Daily, Weekly (through Day 35)	15 is the critical threshold for IEEE	North Polar + South Polar Regions; 50ºN and S is the equatorward boundary for defining the area of interest	Grid-to-Grid	IMS analysis (NH); NSIDC Near Real Time analysis (SH)		
Fire Danger Index		Heidke Skill Score	Weekly or Monthly		Tropics + Mid-Latitudes	Grid-to-Grid	ECMWF Reanalysis (ERA5)	Clarification necessary on climatology source (since reanalysis used as validation)	
Sea-Ice Thickness	Layer depth	RMSE, Bias, Taylor Diagram	daily/weekly	0, 0.5cm, 10cm, 1m	Poles and mid-latitudes	Grid-to-Grid, Grid-to-Obs	SMOS, NASA Icebridge--->ISAT2/CRYOSAT2, YOPP obs	n/a unless Skill Scores requested	
U/V Wind Anomaly	850-hPa	RMS + Mean Error Bias, Heidke Skill Score	Daily, Weekly (through Day 35), Monthly (to F720)		40ºS–40ºN	grid-to-grid	ECMWF Reanalysis (ERA5)	Model's Own Climatology	

FIELD	LEVEL	DETERMNISTIC METRIC	TEMPORAL ATTRIBUTE	NOTABLE THRESHOLDS	REGION	VERIFICATION APPROACH	VALIDATION SOURCE	CLIMATOLOGY SOURCE	SPATIAL MATCHING
U/V Wind Anomaly	200-hPa	RMS + Mean Error Bias, Heidke Skill Score	Daily, Weekly (through Day 35), Monthly (to F720)		40ºS–40ºN	grid-to-grid	ECMWF Reanalysis (ERA5)	Model's Own Climatology	
Precipitation	Surface	RMS+Bias	Daily, Weekly (through Day 35), Monthly (to F720)	use median and 90th percentile	CONUS East + West + Central + South + (Alaska + Hawaii)	grid-to-grid	CCPA, (MRMS Multisensor QPE for AK and HI)	CPC Precip Analysis	PRISM
TIER 4									
Sea-Ice Drift / Velocity	Surface	error radius, mean velocity difference	Daily/Weekly	radius: 25 km velocity error: 2.5 cm/s	Poles and mid-latitudes	grid-to-obs	International Arctic Buoy Program		
Temperature	Sea Surface	RMS Error + Mear	Daily, Weekly (through Day 35), Monthly (to F720)		NH + SH + Tropics	grid-to-grid	GHRSST L4	GHRSST L4	
Temperature	2-meter	Heidke Skill Score, RMS + Mean Error Bias	Daily, Weekly (through Day 35), Monthly (to F720)		CONUS, AK, HI, North America, Global	Grid-to-Grid, Grid-to-Obs	ECMWF Reanalysis (ERA5), METARS	Operational reanalysis (R1 if need long-term, R2 for shorter, CoRE coming along) for CPC - CPC temperature analysis.	
Geopotential Height	500-hPa	RMSE+Bias	Daily, Weekly (through Day 35), Monthly (to F720)		NH + SH + Tropics	grid-to-grid	ECMWF Reanalysis (ERA5)	Operational reanalysis (R1 if need long-term, R2 for shorter, CoRE coming along)	
U/V Wind	850-hPa	RMS + Mean Error Bias, Heidke Skill Score	Daily, Weekly (through Day 35), Monthly (to F720)		40ºS–40ºN	grid-to-grid	ECMWF Reanalysis (ERA5)	Model's Own Climatology	
U/V Wind	200-hPa	RMS + Mean Error Bias, Heidke Skill Score	Daily, Weekly (through Day 35), Monthly (to F720)		40ºS–40ºN	grid-to-grid	ECMWF Reanalysis (ERA5)	Model's Own Climatology	